

E 1.28 SOLAR/1025-79/04

Alpha 1215967

SOLAR/1025-79/04

Monthly Performance Report

HELIO THERMICS, INC. - LOT 6

APRIL 1979



U.S. Department of Energy

National Solar Heating and
Cooling Demonstration Program

National Solar Data Program

NOTICE

This report was prepared as an account of work sponsored by the United States Government. Neither the United States nor the United States Department of Energy, nor any of their employees, nor any of their contractors, subcontractors, or their employees, make any warranty, express or implied, or assume any legal liability or responsibility for the accuracy, completeness or usefulness of any information, apparatus, product or process disclosed, or represents that its use would not infringe privately owned rights.

MONTHLY PERFORMANCE REPORT

HELIO-THERMICS, INC.
HOUSE LOT 6

APRIL 1979

I. SYSTEM DESCRIPTION

Helio-Thermics Inc., House Lot 6 is one of two instrumented single-family residences in Greenville, South Carolina. The home has approximately 1086 square feet of conditioned space. Solar energy is used for space heating the home and preheating domestic hot water (DHW). The solar energy system utilizes the attic space as the solar energy collector. The attic roof faces 10 degrees west of south and is pitched at an angle of 51 degrees from the horizontal. Solar energy enters the attic through a 416-square-foot aperture which is double-glazed with corrugated, translucent, fiberglass-reinforced, acrylic panels. The interior of the attic is painted black to maximize the absorption of solar energy. Warm air accumulates in the peak of the attic roof and circulates through the conditioned space or through storage by an air handler. Solar energy is stored in an 870-cubic-foot storage bin containing 85,460 pounds of crushed rock. The bin is located under the house and is insulated with 2-inch polystyrene insulation. Cold water is preheated in the attic by thermosiphoning water from the 80-gallon preheat tank through a manifold system of copper tubes. These tubes are attached to black sheet-metal plates, thus enhancing absorption of solar radiation for preheating the water as it circulates to and from the preheat tank. Preheated city water is stored in the preheat tank and supplied, on demand, to a conventional 80-gallon DHW tank. When solar energy is insufficient to satisfy the space heating load, a water-to-air heat exchanger in the hot air supply-duct provides auxiliary energy for space heating. A gas-fired water heater provides auxiliary energy for the water-to-air heat exchanger and the DHW. The system, shown schematically in Figure 1, has seven modes of operation.

Mode 1 - Collector-to-Storage: This mode activates when there is no demand for space heating and the collector supply-duct temperature is 26°F higher than the storage temperature. This mode terminates when the temperature difference between the collector and storage is less than 16°F.

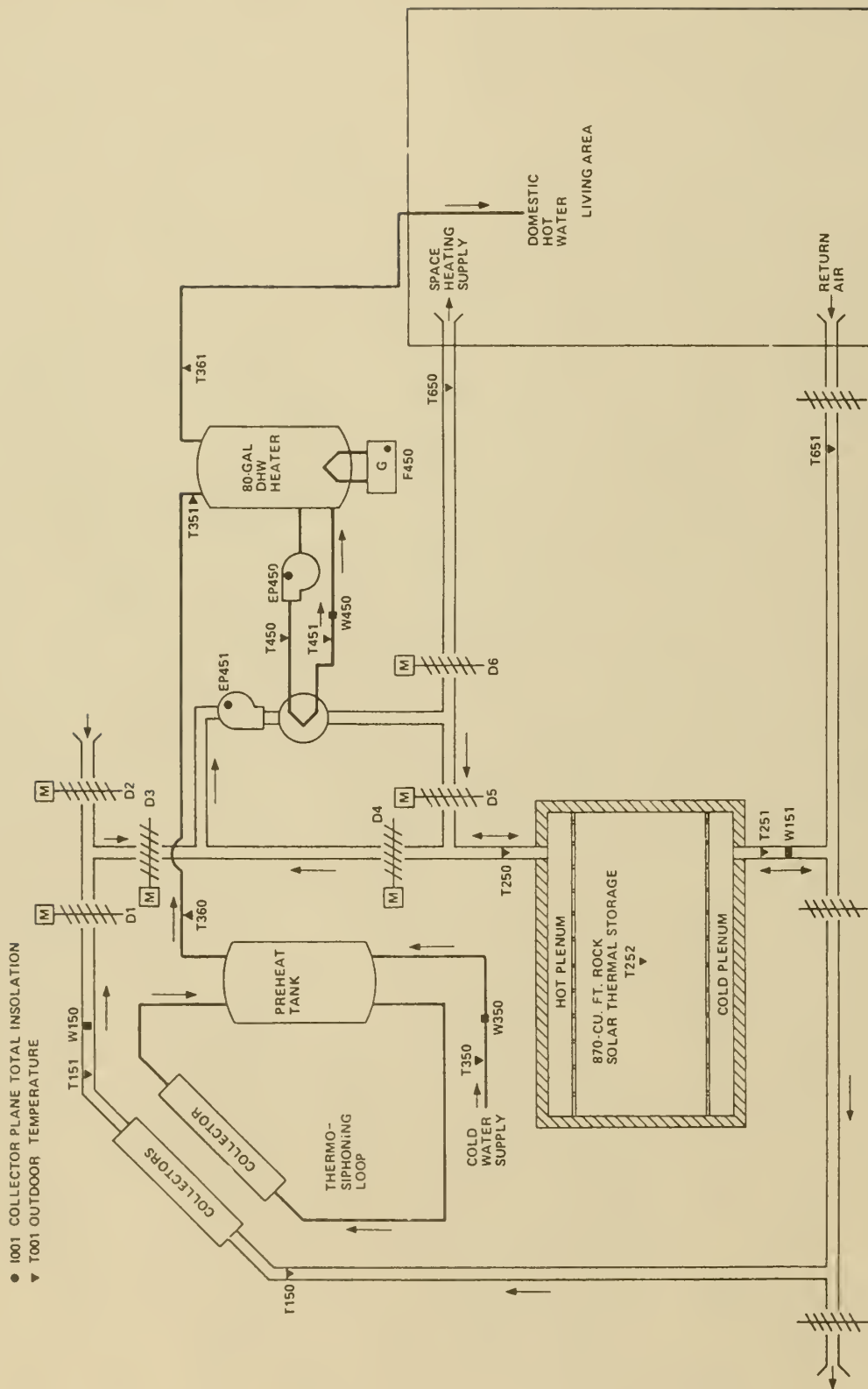


Figure 1. HELIO THERMICS, INC., LOT NO. 6, SOLAR ENERGY SYSTEM SCHEMATIC

Mode 2 - Storage-to-Space Heating: This mode activates when space heating is required (but is not available from the collector) and the storage temperature exceeds the building ambient temperature by 5°F. This mode terminates when the building ambient temperature equals the storage temperature or when space heating is no longer required.

Mode 3 - Collector-to-Space Heating: This mode activates when space heating is required and the collector supply-duct air temperature is 10°F higher than the building ambient air temperature. This mode terminates when the temperature difference drops to less than 6°F or the space heating requirement is satisfied.

Mode 4 - Auxiliary Energy-to-Space Heating: This mode activates when space heating is required and thermal energy is not available from the collectors or storage. An electrical heating element in the hot air supply-duct remains on until the space heating demand is satisfied.

Mode 5 - Summer Mode, Passive Cooling Storage: This mode can be activated when the residents wish to store cool air in storage for circulation the next day. The air-handler fan activates and an outside air-intake damper opens to allow the cool air to circulate through the attic and storage.

Mode 6 - Summer Mode, Space Cooling: This mode can be activated when cool air from storage is desired in the living area. The outside air-intake damper closes, the duct to the living area opens, and the air-handler fan activates.

Mode 7 - DHW Preheating: This mode activates when there is a demand for hot water. Water is drawn from the conventional DHW tank and replenished with heated water from the preheat tank. The DHW subsystem has this one independent mode of operation for preheating.

II. PERFORMANCE EVALUATION

INTRODUCTION

The site was occupied in April and the solar energy system operated continuously during the month. Solar energy satisfied 12 percent of the space heating requirements and provided a fossil fuel energy savings of 0.081 million Btu.

To prevent the possibility of water freezing in the thermosiphoning subsystem, this solar energy system component (located in the attic) has been drained until all danger of freezing is past.

For 16 days during April, the solar energy system was in a partial summer mode; that is, no attempt was made to collect and transport solar energy to the storage subsystem. This method of operation reduces the solar energy migrating into the house during warm days, but also creates an undesirable effect when space heating is required during the night. Occasionally, when solar energy is not being transported to storage, the storage temperature will drop below the temperature in the living area and become ineffective as a source of thermal energy. However, the thermal energy provided by conventional methods to satisfy the heating load also circulates through the storage bin and, in effect, heats the storage bin. This undesirable method of operation occurs during transitional months and has a small impact on the long-term effectiveness of the solar energy system.

WEATHER CONDITIONS

During the month, total incident solar energy on the collector array was 18.1 million Btu for a daily average of 1453 Btu per square foot. This was below the estimated average daily solar radiation for this geographical area during April of 1546 Btu per square foot for a south-facing plane with a tilt

of 51 degrees to the horizontal. The average ambient temperature during April was 59°F as compared with the long-term average for April of 61°F.

THERMAL PERFORMANCE

Collector - The total incident solar radiation on the collector array for the month of April was 18.1 million Btu. During the period the collector loop was operating, the total insolation amounted to 5.0 million Btu. The total collected solar energy for the month of April was 1.2 million Btu, resulting in a collector array efficiency of 7 percent, based on total incident insolation. Solar energy delivered from the collector array to storage was 0.90 million Btu. Energy loss during transfer from the collector array to storage was 0.30 million Btu. This loss represented 25 percent of the energy collected. Operating energy required by the collector loop was 0.11 million Btu.

Storage - Solar energy delivered to storage was 0.90 million Btu. During the latter part of April the system was occasionally operating in a storage-to-load mode. Because the storage temperature was below the living area temperature, relatively cool air was transported from storage, through the conventional space heating subsystem, through the living area and then back to storage. This situation results in the storage temperature being increased by the conventional space heating subsystem. The numerical effect of this operating method is indicated as a negative 0.26 million Btu being transported from storage. The average storage temperature for the month was 76°F.

DHW Load - There was no solar energy contribution to the DHW load of 1.4 million Btu because the thermosiphoning subsystem had been drained. A daily average of 63 gallons of DHW was consumed at an average temperature of 153°F delivered from the tank.

Space Heating Load - The space heating subsystem consumed 0.049 million Btu of solar energy and 0.35 million Btu of auxiliary thermal energy to satisfy a

space heating load of 0.40 million Btu. The solar fraction of this load was 12 percent. The space heating subsystem consumed a total of 0.091 million Btu of operating energy in order to distribute both solar and auxiliary thermal energy.

OBSERVATIONS

The gas flow totalizer used to quantify the gas consumption is not providing valid data. The measurement of auxiliary thermal energy consumption in the DHW subsystem will not be available until this problem is corrected.

ENERGY SAVINGS

The solar energy system provided a total fossil fuel energy savings of 0.081 million Btu at an electrical energy expense of 0.14 million Btu.

III. ACTION STATUS

Boeing will schedule a site visit in the near future to correct the erroneous gas totalizer data readings.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT SITE SUMMARY

SITE: HELICTHERMICS, INC. LOT 6, GREENVILLE, SC
REPORT PERIOD: APRIL, 1979

SOLAR/1025-79/04

SITE/SYSTEM DESCRIPTION:

THE HELICTHERMICS SOLAR ENERGY SYSTEM PROVIDES SPACE HEATING AND DOMESTIC HOT WATER PREHEATING. IN THE SPACE HEATING SUBSYSTEM, THERMAL ENERGY IS TRANSFERRED BY AIR CIRCULATION FROM THE ATTIC TO THE LOAD OR TO CRUSHED ROCK IN AN INSULATED CONCRETE BIN. IN THE DOMESTIC HOT WATER SUBSYSTEM, SOLAR ENERGY IS COLLECTED FROM A 70 SQ. FT ALUMINUM AND COPPER PADDLE IN THE ATTIC AND TRANSFERRED TO AN 80 GAL. PREHEAT TANK BY THERMOPIPHONING. AUXILIARY ENERGY IS PROVIDED TO BOTH SUBSYSTEMS BY A COMMON NATURAL GAS WATER HEATER.

GENERAL SITE DATA:

INCIDENT SOLAR ENERGY

18.138 MILLION BTU
43601 BTU/SQ.FT.

COLLECTED SOLAR ENERGY

1.249 MILLION BTU
3004 BTU/SQ.FT.

AVERAGE AMBIENT TEMPERATURE

59 DEGREES F
73 DEGREES F

AVERAGE BUILDING TEMPERATURE

0.00

0.107 MILLION BTU

ECSS SOLAR CONVERSION EFFICIENCY

0.198 MILLION BTU

ECSS OPERATING ENERGY

0.198 MILLION BTU

* MILLION BTU

TOTAL SYSTEM OPERATING ENERGY

0.198 MILLION BTU

* MILLION BTU

SUBSYSTEM SUMMARY:

LOAD
SOLAR FRACTION
SOLAR ENERGY USED
OPERATING ENERGY
AUX. THERMAL ENERGY
AUX. ELECTRIC FUEL
AUX. FOSSIL FUEL
ELECTRICAL SAVINGS
FOSSIL SAVINGS

HOT WATER
1.418
0.000
N.A.
N.A.
N.A.
N.A.
N.A.
N.A.
0.000

HEATING
0.396
12
0.049
0.091
0.347
N.A.
0.579
-0.032
0.081

COOLING
N.A.
N.A.
N.A.
N.A.
N.A.
N.A.
N.A.
N.A.
N.A.

SYSTEM TOTAL
1.814 MILLION BTU
* PERCENT
0.049 MILLION BTU
0.198 MILLION BTU
* MILLION BTU
N.A. MILLION BTU
* MILLION BTU
-0.139 MILLION BTU
0.081 MILLION BTU

SYSTEM PERFORMANCE FACTOR:

*

* DENOTES UNAVAILABLE DATA

@ DENOTES NULL DATA

N.A. DENOTES NOT APPLICABLE DATA

REFERENCE: USER'S GUIDE TO THE MONTHLY PERFORMANCE REPORT
OF THE NATIONAL SOLAR DATA PROGRAM, FEBRUARY 28, 1978,
SCLAR/0004-78/18

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT SITE SUMMARY

SITE: HELICOTHERMICS, INC. LOT 6, GREENVILLE, SC
REPORT PERIOD: APRIL, 1979

SOLAR/1025-79/04

SITE/SYSTEM DESCRIPTION:

THE HELIOTHERMICS SOLAR ENERGY SYSTEM PROVIDES SPACE HEATING AND DOMESTIC HOT WATER PREHEATING. IN THE SPACE HEATING SUBSYSTEM, THERMAL ENERGY IS TRANSFERRED BY AIR CIRCULATION FROM THE ATTIC TO THE LOAD OR TO CRUSHED ROCK IN AN INSULATED CONCRETE BIN. IN THE DOMESTIC HOT WATER SUBSYSTEM, SOLAR ENERGY IS COLLECTED FROM A 70 SQ. FT ALUMINUM AND COPPER PADDLE IN THE ATTIC AND TRANSFERRED TO AN 80 GAL. PREHEAT TANK BY THERMOSIPHONING. AUXILIARY ENERGY IS PROVIDED TO BOTH SUBSYSTEMS BY A COMMON NATURAL GAS WATER HEATER.

GENERAL SITE DATA:

INCIDENT SOLAR ENERGY

COLLECTED SOLAR ENERGY

AVERAGE AMBIENT TEMPERATURE

AVERAGE BUILDING TEMPERATURE

ECSS SOLAR CONVERSION EFFICIENCY

ECSS OPERATING ENERGY

TOTAL SYSTEM OPERATING ENERGY

TOTAL ENERGY CONSUMED

19.135 GIGA JOULES
495130 KJ/SQ.M.
1.318 GIGA JOULES
34108 KJ/SQ.M.
15 DEGREES C
23 DEGREES C
0.00
0.113 GIGA JOULES
0.209 GIGA JOULES
* GIGA JOULES

SUBSYSTEM SUMMARY:

LOAD
SOLAR FRACTION
SOLAR ENERGY USED
OPERATING ENERGY
AUX. THERMAL ENG
AUX. ELECTRIC FUEL
AUX. FOSSIL FUEL
ELECTRICAL SAVINGS
FOSSIL SAVINGS

HOT WATER
1.496
*
0.000
N.A.
*
N.A.
*
N.A.
0.000

HEATING
0.418
12
0.052
0.096
0.366
N.A.
0.611
-0.034
0.086

COOLING
N.A.
N.A.
N.A.
N.A.
N.A.
N.A.
N.A.
N.A.
N.A.

SYSTEM TOTAL
1.914 GIGA JOULES
* PERCENT
0.052 GIGA JOULES
0.209 GIGA JOULES
* GIGA JOULES
N.A. GIGA JOULES
* GIGA JOULES
-0.146 GIGA JOULES
0.086 GIGA JOULES

SYSTEM PERFORMANCE FACTOR:

*

* DENOTES UNAVAILABLE DATA

@ DENOTES NULL DATA

N.A. DENOTES NOT APPLICABLE DATA

REFERENCE: USER'S GUIDE TO THE MONTHLY PERFORMANCE REPORT
OF THE NATIONAL SOLAR DATA PROGRAM, FEBRUARY 28, 1978,
SOLAR/0004-78/18

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT ENERGY COLLECTION AND STORAGE SUBSYSTEM (ECSS)

SOLAR/1025-79/04

SITE: HELIOTHERMICS, INC. LCT 6, GREENVILLE, SC
REPORT PERIOD: APRIL, 1979

DAY OF MONTH	INCIDENT SOLAR ENERGY MILLION BTU	AMBIENT TEMP DEG-F	ENERGY TO LOADS MILLION BTU	AUX THERMAL TO ECSS MILLION BTU	ECSS OPERATING ENERGY MILLION BTU	ECSS ENERGY REJECTED MILLION BTU	ECSS SOLAR CONVERSION EFFICIENCY
1	0.694	67	0.000	NOT APPLICABLE	0.017	NOT APPLICABLE	0.000
2	0.106	64	0.000		0.000		0.000
3	0.034	58	0.000		0.000		0.000
4	0.082	54	0.002		0.000		0.023
5	0.945	54	0.018		0.017		0.019
6	0.935	57	0.007		0.017		0.007
7	0.892	55	0.002		0.017		0.003
8	0.413	56	0.000		0.007		0.001
9	0.929	58	0.000		0.005		0.000
10	0.902	50	0.004		0.013		0.004
11	0.182	56	0.000		0.000		0.000
12	0.138	61	0.000		0.000		0.000
13	0.043	59	0.000		0.000		0.000
14	0.834	60	0.000		0.011		0.002
15	0.925	58	0.002		0.000		0.003
16	0.908	55	0.003		0.003		0.008
17	0.904	58	0.008		0.000		0.003
18	0.883	58	0.000		0.000		0.000
19	0.870	58	0.000		0.000		0.000
20	0.657	61	0.000		0.000		0.000
21	0.773	64	0.000		0.000		0.000
22	0.755	67	0.000		0.000		0.000
23	0.378	67	0.000		0.000		0.000
24	0.337	66	0.000		0.000		0.000
25	0.083	61	0.000		0.000		0.000
26	0.257	64	0.000		0.000		0.000
27	0.674	64	0.000		0.000		0.000
28	0.854	58	0.000		0.000		0.000
29	0.709	50	0.001		0.001		0.002
30	0.839	57	0.000		0.001		0.000
SUM	18.138	-	0.049	N.A.	0.107	N.A.	-
AVG	0.605	59	0.002	N.A.	0.004	N.A.	0.003
NBS ID	0001	N113			0102		N111

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT COLLECTOR ARRAY PERFORMANCE

SITE: HELIOTHERMICS, INC. LOT 6, GREENVILLE, SC SOLAR/1025-79/04
REPORT PERIOD: APRIL, 1979

DAY OF MONTH	INCIDENT SOLAR ENERGY MILLION BTU	OPERATIONAL INCIDENT ENERGY MILLION BTU	COLLECTED SOLAR ENERGY MILLION BTU	DAYTIME AMBIENT TEMP DEG F	COLLECTOR ARRAY EFFICIENCY
1	0.694	0.610	0.170	78	0.245
2	0.106	0.000	0.000	67	0.000
3	0.034	0.000	0.000	57	0.000
4	0.082	0.001	0.000	53	0.000
5	0.945	0.831	0.220	64	0.233
6	0.939	0.827	0.206	70	0.220
7	0.892	0.777	0.233	69	0.261
8	0.413	0.239	0.053	71	0.127
9	0.929	0.250	0.047	70	0.050
10	0.902	0.684	0.158	62	0.176
11	0.182	0.000	-0.000	63	-0.001
12	0.138	0.000	0.000	61	0.000
13	0.043	0.000	0.000	69	0.000
14	0.834	0.000	-0.000	73	-0.157
15	0.925	0.636	0.145	70	0.000
16	0.508	0.000	0.000	70	0.007
17	0.904	0.044	0.006	71	0.004
18	0.883	0.025	0.003	71	0.000
19	0.870	0.000	0.000	73	0.000
20	0.857	0.000	0.000	79	0.000
21	0.773	0.000	0.000	74	0.000
22	0.755	0.000	0.000	73	0.000
23	0.378	0.000	0.000	68	0.000
24	0.337	0.000	0.000	72	0.000
25	0.083	0.000	0.000	70	0.000
26	0.257	0.000	0.000	62	-0.000
27	0.674	0.000	-0.000	71	0.007
28	0.854	0.000	0.005		0.004
29	0.709	0.029	0.004		
30	0.839	0.024			
SUM	18.138	4.977	1.249	-	-
AVG	0.605	0.166	0.042	69	0.069
NBSID	Q001		Q100		N100

* DENOTES UNAVAILABLE DATA.

@ DENOTES NULL DATA.

N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT STORAGE PERFORMANCE

SITE: HELIOTHERMICS, INC. LOT 6, GREENVILLE, SC SOLAR/1025-79/04
REPORT PERIOD: APRIL, 1979

DAY OF MONTH	ENERGY TO STORAGE MILLION BTU	ENERGY FROM STORAGE MILLION BTU	CHANGE IN STORED ENERGY MILLION BTU	STORAGE AVERAGE TEMP DEG F	STORAGE EFFICIENCY
1	0.122	0.000	0.040	92	0.330
2	0.000	0.000	-0.095	90	1.000
3	0.000	0.000	-0.072	86	1.000
4	0.000	0.002	-0.065	82	-190.238
5	0.156	0.015	0.097	80	0.718
6	0.156	0.007	0.125	88	0.839
7	0.164	0.002	0.061	94	0.388
8	0.042	0.000	-0.057	95	-1.353
9	0.035	-0.023	-0.097	91	-3.394
10	0.113	-0.035	0.074	85	0.341
11	-0.001	-0.061	-0.398	72	708.936
12	0.000	-0.021	0.034	69	1.000
13	0.000	-0.001	0.017	71	1.000
14	-0.000	-0.010	-0.008	71	480.174
15	0.108	-0.026	0.168	72	1.326
16	0.000	-0.019	-0.099	76	1.000
17	0.000	-0.002	-0.061	72	1.000
18	-0.000	-0.015	-0.008	71	2184.424
19	0.000	-0.014	-0.010	70	1.000
20	0.000	-0.008	0.000	70	1.000
21	0.000	-0.007	-0.002	70	1.000
22	0.000	0.000	0.002	70	1.000
23	0.000	0.000	0.006	70	1.000
24	0.000	0.000	0.002	70	1.000
25	0.000	0.000	-0.000	71	1.000
26	0.000	0.000	-0.002	70	1.000
27	0.000	-0.004	0.000	70	1.000
28	0.000	-0.026	-0.027	69	1.000
29	-0.000	-0.009	-0.013	68	130.824
30	-0.000	-0.008	0.006	68	15.173
SUM	0.896	-0.261	-0.383	-	-
AVG	0.030	-0.009	-0.013	76	-0.719
NBS ID	Q200	Q201	Q202		N108

* DENOTES UNAVAILABLE DATA.

@ DENOTES NULL DATA.

N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM
MONTHLY REPORT
HOT WATER SUBSYSTEM

SITE: HELIOTHERMICS, INC. LOT 6, GREENVILLE, SC
REPORT PERIOD: APRIL, 1979 SOLAR/1025-79/04

DAY OF MON.	HOT WATER LOAD MILLION BTU	SOLAR FR. OF LOAD PER CENT	SOLAR ENERGY USED MILLION BTU	OPER ENERGY MILLION BTU	AUX THERMAL USED MILLION BTU	AUX ELECT FUEL MILLION BTU	AUX FOSSIL FUEL MILLION BTU	ELECT ENERGY SAVINGS MILLION BTU	FOSSIL ENERGY SAVINGS MILLION BTU	SUP. WAT. TEMP DEG F	HOT WAT. TEMP DEG F	HOT WATER USED GAL
1	0.104	*	0.000	NOT	*	NOT	*	NOT	0.000	69	149	146
2	0.018	*	0.000		*		*		0.000	66	153	25
3	0.030	*	0.000		*		*		0.000	62	152	41
4	0.089	*	0.000		*		*		0.000	57	155	107
5	0.020	*	0.000		*		*		0.000	59	156	26
6	0.085	*	0.000		*		*		0.000	63	157	105
7	0.025	*	0.000		*		*		0.000	64	141	37
8	0.054	*	0.000		*		*		0.000	65	152	70
9	0.058	*	0.000		*		*		0.000	64	158	79
10	0.046	*	0.000		*		*		0.000	56	155	55
11	0.016	*	0.000		*		*		0.000	61	156	21
12	0.094	*	0.000		*		*		0.000	62	155	50
13	0.039	*	0.000		*		*		0.000	63	158	44
14	0.034	*	0.000		*		*		0.000	63	154	17
15	0.014	*	0.000		*		*		0.000	67	154	118
16	0.056	*	0.000		*		*		0.000	68	156	98
17	0.071	*	0.000		*		*		0.000	69	157	40
18	0.031	*	0.000		*		*		0.000	66	156	18
19	0.012	*	0.000		*		*		0.000	71	156	99
20	0.076	*	0.000		*		*		0.000	69	151	70
21	0.043	*	0.000		*		*		0.000	74	151	30
22	0.020	*	0.000		*		*		0.000	72	154	63
23	0.044	*	0.000		*		*		0.000	72	155	86
24	0.060	*	0.000		*		*		0.000	67	149	57
25	0.040	*	0.000		*		*		0.000	67	147	55
26	0.038	*	0.000		*		*		0.000	71	149	41
27	0.028	*	0.000		*		*		0.000	75	148	26
28	0.018	*	0.000		*		*		0.000	64	149	95
29	0.069	*	0.000		*		*		0.000	67	145	63
30	0.045	*	0.000		*		*		0.000	-	-	1898
SUM	1.418	-	0.000	N.A.	N.A.	N.A.	N.A.	N.A.	0.000	-	-	63
AVG	0.047	*	0.000	N.A.	N.A.	N.A.	N.A.	N.A.	0.000	66	153	N308
NBS	Q302	N300	Q300	Q303	Q301	Q305	Q306	Q311	Q313	N305	N307	

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT SPACE HEATING SUBSYSTEM

SOLAR/1025-79/04

SITE: HELIOTHERMICS, INC. LOT 6, GREENVILLE, SC
REPORT PERIOD: APRIL, 1979

DAY OF MO.	SPACE HEATING LOAD MILLION BTU	SOLAR FR. OF LOAD PCT	SOLAR ENERGY USED MILLION BTU	OPER ENERGY MILLION BTU	AUX THERMAL USED MILLION BTU	AUX ELECT FUEL MILLION BTU	AUX FOSSIL FUEL MILLION BTU	ELECT ENERGY SAVINGS MILLION BTU	FOSSIL ENERGY SAVINGS MILLION BTU	BLDG TEMP DEG. F	AMB TEMP DEG. F
1	0.000	0	0.000	0.000	0.000	NOT	0.000	0.000	0.000	75	67
2	0.000	0	0.000	0.000	0.000	NOT	0.000	0.000	0.000	75	64
3	0.000	0	0.000	0.000	0.000	NOT	0.000	0.000	0.000	74	58
4	0.002	59	0.002	0.002	0.000	NOT	0.000	-0.002	0.003	70	54
5	0.018	99	0.018	0.013	0.000	NOT	0.000	-0.013	0.030	71	54
6	0.007	97	0.007	0.002	0.000	NOT	0.000	0.000	0.011	72	57
7	0.003	58	0.002	0.001	0.000	NOT	0.000	-0.001	0.004	73	55
8	0.000	64	0.000	0.000	0.000	NOT	0.000	0.001	0.000	71	56
9	0.000	76	0.000	0.000	0.000	NOT	0.000	0.006	0.000	72	58
10	0.023	15	0.004	0.010	0.020	NOT	0.033	-0.008	0.006	71	50
11	0.000	0	0.000	0.000	0.000	NOT	0.000	0.000	0.000	72	56
12	0.013	0	0.000	0.002	0.013	NOT	0.021	-0.000	0.000	73	61
13	0.000	0	0.000	0.000	0.000	NOT	0.000	0.000	0.000	74	59
14	0.005	0	0.000	0.001	0.005	NOT	0.009	-0.000	0.000	72	60
15	0.029	7	0.002	0.004	0.027	NOT	0.045	-0.000	0.004	71	58
16	0.019	15	0.003	0.009	0.016	NOT	0.027	-0.006	0.005	71	55
17	0.021	37	0.008	0.009	0.013	NOT	0.022	-0.007	0.013	72	58
18	0.025	10	0.002	0.003	0.022	NOT	0.037	-0.000	0.004	72	58
19	0.020	0	0.000	0.002	0.020	NOT	0.033	-0.000	0.000	72	58
20	0.016	0	0.000	0.002	0.016	NOT	0.027	-0.000	0.000	72	61
21	0.000	0	0.000	0.000	0.000	NOT	0.000	0.000	0.000	73	64
22	0.000	0	0.000	0.000	0.000	NOT	0.000	0.000	0.000	76	67
23	0.000	0	0.000	0.000	0.000	NOT	0.000	0.000	0.000	75	67
24	0.000	0	0.000	0.000	0.000	NOT	0.000	0.000	0.000	75	66
25	0.000	0	0.000	0.000	0.000	NOT	0.000	0.000	0.000	73	61
26	0.000	0	0.000	0.000	0.000	NOT	0.000	0.000	0.000	72	64
27	0.011	0	0.000	0.002	0.011	NOT	0.018	-0.000	0.000	74	64
28	0.076	0	0.000	0.011	0.076	NOT	0.126	-0.000	0.000	71	58
29	0.073	1	0.001	0.011	0.072	NOT	0.120	-0.001	0.002	70	50
30	0.036	0	0.000	0.006	0.036	NOT	0.060	-0.001	0.000	72	57
SUM	0.396	-	0.049	0.091	0.347	N.A.	0.579	-0.032	0.081	-	-
AVG	0.013	12	0.002	0.003	0.012	N.A.	0.019	-0.001	0.003	73	59
NBS	Q402	N400	Q400	Q403	Q401	-	Q410	Q415	Q417	N406	N113

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT ENVIRONMENTAL SUMMARY

SITE: HELIOTHERMICS, INC. LOT 6, GREENVILLE, SC
REPORT PERIOD: APRIL, 1979

SOLAR/1025-79/04

DAY OF MONTH	TOTAL INSOLATION BTU/SQ.FT	DIFFUSE INSOLATION BTU/SQ.FT	AMBIENT TEMPERATURE DEG F	DAYTIME AMBIENT TEMP DEG F	RELATIVE HUMIDITY PERCENT	WIND DIRECTION DEGREES	WIND SPEED M.P.H.
1	1668	NOT APPLICABLE	67	78	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE
2	255		64	67			
3	81		58	57			
4	198	APPLICABLE	54	53	APPLICABLE	APPLICABLE	APPLICABLE
5	2271		54	64			
6	2258		57	70			
7	2143		55	69			
8	994		56	71			
9	2234		58	70			
10	2169		50	62			
11	438		56	63			
12	331		61	61			
13	103		59	69			
14	2006		60	73			
15	2222		58	70			
16	2183		55	70			
17	2173		58	71			
18	2123		58	71			
19	2091		58	73			
20	2060		61	79			
21	1857		64	79			
22	1815		67	74			
23	908		67	73			
24	810		66	73			
25	200		61	63			
26	618		64	68			
27	1621		64	72			
28	2052		58	70			
29	1705		50	62			
30	2016		57	71			
SUM	43601	N.A.	-	-	-	-	-
AVG	1453	N.A.	59	69	N.A.	N.A.	N.A.
NBS ID	Q001		N113			N115	N114

* DENOTES UNAVAILABLE DATA.

@ DENOTES NULL DATA.

N.A. DENOTES NOT APPLICABLE DATA.

UNIVERSITY OF FLORIDA



3 1262 09052 6335